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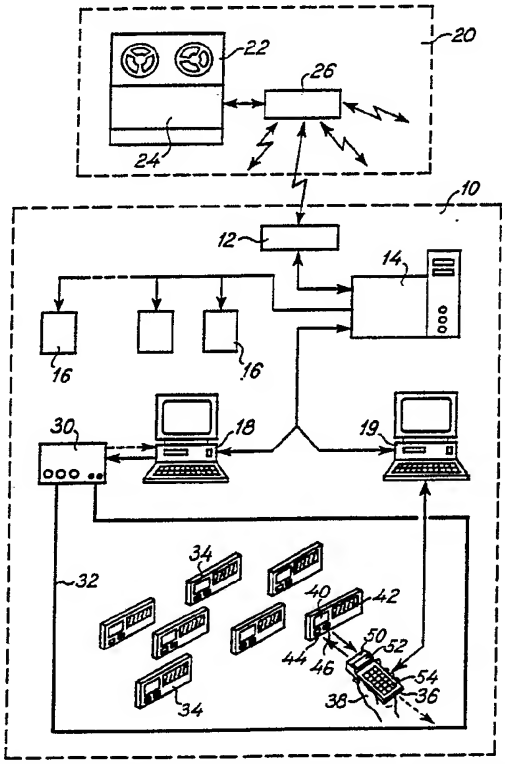
(54) Title: AN ELECTRONIC PRICING SYSTEM




(57) Abstract

An electronic pricing system (10), for example for use in department stores, comprises a central computer (14), a wireless transmitter (30), a plurality of electronic pricing modules (34), and an IR communication terminal (36). The computer (14) containing information about various goods may transmit such information to the relevant pricing modules (34) via the transmitter (30) by means of the IR communication terminal (36) which may be hand held, information may be read into the electronic memory of a specific pricing module, from which information may also be read into the memory of the communication terminal.

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## + DESIGNATIONS OF "SU"

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# AN ELECTRONIC PRICING SYSTEM

The present invention relates to the technical field of information and transmission and more specifically to the technical field of displaying current pricing information or similar information on electronic price modules, which are mounted on shelves or similar supports, on which articles, goods or item are stored, or in similar applications, e.g. within the technical field of informing passengers in trains, buses or airplanes regarding reservations of seats or the like, the technical field of informing customers in stores, offices, retail shops, general stores or in similar places.

The technique of providing information regarding current prices by employing electronics and electronic display units has been known for quite some time and is described in numerous patents and patent applications, such as US patent No. 4,500,880 and US patent No. 4,766,295, to which reference is made, and which are herewith incorporated in the presented specification by reference. The advantages of providing a real time information of the customers has been realised, and the above patents describe among other references technical solutions which attempt to provide a universally applicable information system, which in a reliable manner informs the customers of the current prices of individual articles, items or goods stored on the shelves or the like, or similar information in equivalent applications.

The prior art electronic price information system, however, have not found commercial success as on the one hand the systems are highly elaborated and costly and on the other hand are not completely reliable in operation. Although e.g. the electronic pricing display described in the last mentioned US patent has to some extent been elaborated by providing two identical infrared communication systems, one of which is communicating information from a central

back office computer, and another one of which is a short range communication system in which a hand held terminal may address a specific electronic pricing module, the doubling of the infrared transmission system does not eliminate all drawbacks and shortcomings of the electronic pricing systems known up to now.

Thus, the IR transmission method is highly adequate and efficient in short range wireless transmission, whereas it has been realised within numerous technical fields that it is highly complicated and highly costly to provide a total coverage of an area by infrared radiators, as an IR detector which is to receive information from an IR radiator has to be arranged in clear sight from the radiator. Often, e.g. in shop, stores or the like, certain shelves or similar supports on which articles, goods or items are shelved or stored cannot readily be arranged in such a manner that an infrared detector is arranged under all circumstances in clear sight from the infrared radiator. It is to be realised that the infrared radiation receiving electronic pricing module has on the one hand to be arranged within the customers' sight and at the same time in clear sight from the infrared radiator. These requirements are often in mutual contradiction and result in that the infrared radiation detecting electronic pricing modules do not receive the information from the infrared radiators, as e.g. customers block the IR transmission path from the infrared radiators to the IR detecting electronic pricing module.

An object of the present invention is to provide an electronic pricing system which on the one hand is of a fairly simple structure and may consequently be provided at a low cost and on the other hand ensures a reliable operation, i.e. ensures that information to be transmitted from e.g. a central computer of the store or shop in question is in all instances received by the intentional receiving electronic pricing module.

A particular advantage of the present invention is that the electronic pricing module in accordance with the present invention is of a modular structure and may be modified for alternative transmission applications, e.g. for radio frequency transmission, for hard wire transmission or any other appropriate transmission application.

A particular feature of the electronic pricing system according to the present invention is the provision of additional information, which renders it possible to the staff of the store or shop in question to deduce relevant information regarding the articles, goods or items to which the electronic pricing module is assigned.

The above object, advantage and feature and numerous other advantages, objects and features, which will be evident from the description below, are in accordance with the teachings of the present invention obtained by means of an electronic pricing system comprising:

a central computer means generating information regarding a specific article, the information including an address code identifying the article, and a price code identifying the price of the article,

a wireless transmitter means receiving the information from the central computer means and generating a transmission signal,

an aerial means connected to the wireless transmitter means for receiving the transmission signal therefrom and for wireless transmitting the transmission signal,

a plurality of electronic pricing modules each having a specific address code and each including

a wireless receiver means for receiving the transmission signal from the aerial means and for converting the transmission signal into a receiver signal including an address code and a price code,

a comparator means for determining whether the receiver signal generated by the wireless receiver means includes an address code identical to the specific address code of the individual electronic pricing module or not,
a memory means for storing the price code of the receiver signal generated by the wireless receiver means provided the comparator means has positively determined identity between the address code of the receiver signal and the specific address code of the individual electronic pricing module,
a display means for displaying the price code stored in the memory means,
an IR input/output means for input of information into and output of information from the memory means through the IR input/output means, and
an IR communication terminal comprising an electronic memory means, an actuator means and an IR input/output means for, in a first operational mode by activation of the actuator means, output of information from the electronic memory means of the IR communication terminal to the IR input/output means of a specific electronic pricing module for storing the information in the memory means of the specific electronic pricing module, and for, in a second operational mode by activation of the actuator means, input of information from the specific electronic pricing module, which information is output from the memory means of the specific electronic pricing module and output from the IR input/output means thereof to the IR input/output means of the IR communication terminal for storing the information in the memory means thereof.

In the present context, the terms "address" and "price" and combinations of the terms address/price and code, information, etc. are generic terms, which are to be understood identifying information, codes, etc., which in e.g. numeric

of alphanumeric representation represent an address, i.e. identify an intentional receiving electronic pricing module to which electronic pricing module a specific article or item or a specific type of goods is assigned, and which at least represent the price in numeric representation of the article or item in question and optionally additional information, such as the name of or type of article or item in question, a price per unit, per kilo or per litre, etc., respectively. Also, the terms articles, goods and items are generic terms such as articles, goods or items which are sold from shops or stores, etc. or presented to customers or persons in a similar situation, e.g. in exhibitions, serving information purposes etc.

As stated above, the provision of a wireless transmitter means communicating with an aerial means for transmitting information from the central computer means to the electronic pricing modules almost totally ensures that the relevant information is received by the intentional receiving electronic pricing module. Still, the provision of an IR communication terminal renders it possible to input specific information into a specific electronic pricing module and further to obtain information regarding the specific electronic pricing module, or more precisely the articles, items or goods to which the electronic pricing module is assigned.

The wireless transmission from the wireless transmitter means and the aerial means connected thereto may in accordance with the teachings of the present invention be performed in any appropriate manner within any relevant and adequate frequency band, long wave, medium wave, short wave, VHF or UHF. In the presently preferred embodiment of the electronic pricing system according to the present invention, the wireless transmitter means is, however, an induction loop transmitter generating an amplitude modulated, frequency modulated, or phase modulated long wave

transmission signal, such as a transmission signal of a frequency of 10-150 kHz, and the aerial means is an induction loop tuned to that frequency. Preferably, the long wave transmission is a frequency modulated long wave transmission.

Alternatively, the wireless transmitter is a VHF or UHF transmitter generating an amplitude modulated, frequency modulated or phase modulated VHF or UHF transmission signal, such as a transmission signal of a frequency of 20 MHz - 1 GHz, and the aerial means is alternatively a VHF or UHF aerial. Provided the transmission is carried out as a VHF transmission, the transmitter is preferably a frequency modulated VHF transmitter, such as a transmitter generating a VHF transmission signal of a frequency of the order of 50 MHz.

Although the electronic pricing module of the electronic pricing system according to the present invention may be implemented in accordance with any hard ware/soft ware implementation or any combination thereof also including foam ware and still further including highly elaborated electronic circuit techniques, such as thick film and hybrid technique, LSI and ASIC, the electronic pricing module presently preferably includes central processor means, such as a microprocessor comprising the memory means and the comparator means of the electronic pricing module. By the provision of a central processor means of the electronic pricing module, a low power consuming electronic pricing module is readily provided.

In some instances, the area covered e.g. by an induction loop has been established and later on, exhibition stands or the like, are arranged outside the area covered by the induction loop. In these instances, the electronic pricing module preferably further including a hard wire input means for receiving an input signal constituting the receiver

signal including the address code and the price code, since the electronic price module in such applications cannot receive the wireless transmission signal from the wireless transmitter means and the aerial means connected thereto.

As indicated above, the teachings and concept of the present inventions render it possible to provide additional information to the staff of the shop or store in question regarding the articles, goods or items to which the individual electronic pricing modules are assigned. Thus, in accordance with this particular feature of the electronic pricing system according to the present invention, the central computer means generates information additionally including an additional code, the electronic pricing module additionally converts the transmission signal into a receiver signal additionally including an additional code, the memory means additionally stores the additional code provided the comparator means has positively determined identity between the address code of the receiver signal and the specific address code of the individual electronic pricing module, and the IR communication terminal additionally, in a third operational mode by activation of the actuator means, addresses the memory means of the specific electronic pricing module through the IR input/output means of the IR communication terminal and through the IR input/output means of the specific electronic pricing module for displaying the additional code stored in the memory means of the specific electronic pricing module on the display means of the specific electronic pricing module.

Thus, as will be discussed in greater detail below the staff may by means of the IR communication terminal provide information on the display of the electronic pricing module in question regarding the articles, goods or items to which the electronic pricing module in question is assigned. The additional information represented by the additional code may comprise e.g. the total amount of articles, goods or

items to be stored on a last week's sales rate, this week's sales rate, turnover, etc. The additional information may be determined by the manager or staff running the electronic pricing system in question.

For powering the electronic pricing module, the specific electronic pricing module preferably comprises an integral power supply means, which further preferably includes a solar cell. Thus, provided the integral power supply means includes a solar cell, the individual pricing module is a self-contained, self-powered module, which is powered by the sunlight or artificial light to which the electronic pricing module in question is exposed.

Alternatively, the integral power supply means may include a battery power supply means, which battery power supply means may further comprise a rechargeable power supply means. Provided the electronic pricing module is - in accordance with the above described alternative embodiment - adapted to hard wire communication, the hard wire input means may further receive a power supply signal for recharging the rechargeable power supply means of the electronic pricing module.

The information transmission may be carried out in parallel or serial configuration. Preferably, the address code and the price code and optionally the additional code are transmitted in a serial configuration constituting an information message in which the intentional receiving electronic pricing module is identified by the address code, which constitutes a first segment of the entire message. Thus, provided the address code constitutes a first segment of the entire message, the individual electronic pricing modules, except for the intentional receiving electronic pricing module the address codes of which is identical to the address code transmitted from the central computer means through the wireless transmitter

means and the aerial means, may turn to an idle operational mode or low power operational mode after the receipt of the address code.

In accordance with a further feature of the electronic pricing system according to the present invention, all electronic pricing modules may in an alternative wireless transmission mode be addressed for outputting the additional code stored within the memory means of the individual electronic pricing module from the central computer means. Thus, in accordance with this particular feature of the present invention, the central computer means alternatively generates an addressing signal, the wireless transmitter means alternatively receives the addressing signal and generates an addressing transmission signal, which is transmitted by means of the aerial means and received by the individual wireless receiver means of the plurality of electronic pricing modules, the individual wireless receiver means receive the addressing transmission signal and convert the addressing transmission signal into an addressing signal for addressing the memory means of the individual electronic pricing module for displaying the additional code stored in the memory means of the individual electronic pricing module on the display means thereof.

The present invention also relates to an electronic pricing module constituting a component of the electronic pricing system according to the present invention and still further relates to an IR communication terminal constituting an IR communication terminal of the electronic pricing system according to the present invention.

Thus, in accordance with a further aspect of the present invention, an electronic pricing module is provided comprising:

a wireless receiver means for receiving a transmission signal from an aerial means, and for converting the trans-

mission signal into a receiver signal including an address code and a price code,

a comparator means for determining whether the receiver signal generated by the wireless receiver means includes an address code identical to a specific address code of the individual electronic pricing module,

a memory means for storing the price code of the receiver signal generated by the wireless receiver means provided the comparator means has positively determined identity between the address code of the receiver signal and the specific address code of the individual electronic pricing module,

a display means for displaying the price code stored in the memory means, and

an IR input/output means for input of information into and output of information from the memory means through the IR input/output means, and

further having any of the characteristics of the electronic pricing modules of the electronic pricing system according to the present invention.

In accordance with a further aspect of the present invention, an IR communication terminal is provided comprising an electronic memory means, an actuator means and an IR input/output means for, in a first operational mode by activation of the actuator means, output of information from the electronic memory means of the IR communication terminal to an IR input/output means of an electronic pricing module of the electronic pricing system according to the present invention, and for in a second operational mode by actuation of the actuator means, input of information from the specific electronic pricing module, through the IR input/output means thereof to the IR input/output means of the IR communication terminal for storing the information in the memory means thereof, and further comprising any of the features of the IR communication termi-

nal of the electronic pricing system according to the present invention.

The invention will now be further described with reference to the drawings, in which

Fig. 1 is an overall schematic view of an electronic pricing system according to the present invention,

Fig. 2 is a diagrammatical view of a an electronic circuit of an electronic pricing module according to the present invention,

Fig. 3 is a detailed diagrammatical view of a prototype implementation of the electronic pricing module shown in Fig. 2,

Fig. 4 is a diagrammatical view of an induction loop receiver section of the electronic pricing module shown in Fig. 2,

Fig. 5 is a diagrammatical view of an IR control terminal constituting a communication terminal of the system shown in Fig. 1,

Fig. 6 is a diagrammatical view of an RF receiver section of the electronic pricing module shown in Fig. 2,

Fig. 7 is a schematic and exploded view of an electronic pricing module implemented in accordance with the teachings of the present invention,

Fig. 8 is a schematic and perspective view of an alternative embodiment of the electronic pricing module according to the present invention, and

Fig. 9 is a diagrammatical view of a single period of a communication sequence transmitted by the electronic pricing system to a specific electronic pricing module of the system.

In Fig. 1, an overall schematic view of an electronic pricing system is shown, which system communicates with, i.e. receives information from and supplies information to, a computer system of a retail shop, which computer system further communicates with a central computer system or a

main computer system of e.g. chain stores, a central office computer system, a banking computer, a computer system of a credit or debit card issuing organisation, a computer service system supporting and servicing the computer system and the operation of the shop in question.

The main computer system is shown in the top part of Fig. 1 within a dotted line block and is designated the reference numeral 20. The main computer system 20 is shown comprising a magnetic tape store 22, a main frame 24 and a communication center 26, to which the main frame 24 supplies information and from which the main frame 24 receives information and through which communication center 26 information is further supplied to and received from remotely located shop or office computer systems. The communication center 26, as is well-known in the art, preferably comprises compiler sections, encryption/decryption sections, modems, etc. for each shop computer system or office computer system with which the main computer system 20 communicates.

Within a dotted line block 10, a shop computer system comprising an electronic pricing system according to the present invention is shown. The shop computer system 10 comprises an input/output module 12, through which communication is established to and from the communication center 26 of the main computer system 20 through a data transmission line, e.g. a public data transmission line, a telephone line, a wireless communication link, etc. or a combination thereof. The input/output module 12 communicates with a back office computer system 14 of the shop in question, which back office computer 14 further communicates with a plurality of cash registers, one of which is designated the reference numeral 16. The back office computer 14 further communicates with two personal computers or PC's 18 and 19. The PC 18 further communicates with an induction loop transmitter 30, to which an induction loop 32 is

connected. Within the area covered by the induction loop 32, a plurality of electronic pricing modules implemented in accordance with the teachings of the present invention are arranged, one of which is designated the reference numeral 34. As will be described in greater detail below, the electronic pricing modules 34 receive information from the PC 18 and from the back office computer 14 and optionally the main computer system 20 through the induction loop 32 and may further receive information from and supply information to an IR communication terminal 36, which is shown in the right-hand lower part of Fig. 1. As is evident from Fig. 1, the IR communication terminal 36 is a portable terminal to be held in a hand 38 and is adapted to perform a two-way IR communication with the electronic pricing module 34 and further adapted to carry out a two-way communication routine with the PC 19 or any alternative communication terminal, through which the terminal 36 may receive information from the back office computer 14 and further supply information to the back office computer 14 regarding specific articles or items sold by the shop in question, regarding codes, prices, quantities, sales rates, discounts, special bargains, etc. of the articles or items in question.

The electronic pricing system 10 is generally operated in the following manner. At a specific stand or similar support, an electronic pricing module 34 is mounted at or adjacent to the articles or items to which the electronic pricing module is related. The electronic pricing module provides information to the customer regarding the price of the articles or items in question, such as the price per unit, per kilo, per litre, etc. regarding the articles or items in question and informs the customer about discounts, if any. The electronic pricing module 34 is a wireless self-powered module, which may further provide relevant information to the staff concerning the articles or items to which the electronic pricing module in question is

addressed, such as information regarding the sales rate, last week's price, the amount of articles at the stand in question, etc.

Contrary to conventional communication terminals used in retail shops, the communication module 36 of the electronic pricing system according to the present invention is a far less elaborated and far less intelligent communication terminal as the terminal 36 merely serves two main purposes, viz. the purpose of addressing a specific electronic pricing module for providing information from the electronic pricing module in question, and the purpose of displaying the information to the person operating the communication terminal 36 or for transferring the information from the electronic pricing module 34 in question to the communication terminal 36. After receipt of information or data from the electronic pricing module, the information is stored in a store of the communication terminal 36 and may later on be output to an external data processing unit, such as the PC 19.

The electronic pricing module 34 basically comprises a central control unit constituting the intelligent centre of the module, which centre is addressed through the induction loop 32 or alternatively from the communication terminal 36, and further comprises a power supply preferably constituted by a solar cell, a display and IR communication means constituted by IR emitter and IR receiver diodes. In Fig. 1, the solar cell of the electronic pricing module is shown and designated the reference numeral 40, the display is shown and designated the reference numeral 42 and the receiver IR diode is shown and designated the reference numeral 34, and the IR emitter diode is further shown designated the reference numeral 46. As is evident from Fig. 1, the IR communication terminal 36 comprises a housing 50, in which a display 52 is mounted together with a keyboard 54.

In Fig. 2, a diagrammatical view of an electronic circuitry of the electronic pricing module 34 is shown comprising the solar cell 40, the display 42 and the IR communication diodes 44 and 46, which diodes 44 and 46 are enclosed within a solid line block 48 and further enclosed within a dotted line block 50. The electronic circuitry further comprises three additional dotted line blocks 52, 54 and 56 and may further comprise a battery supply 58, which battery supply 58 may constitute a back-up power supply or may constitute an alternative to the solar cell supply constituted by the solar cell 40.

Within the dotted line block 52, a combined central microprocessor and display driver 60 is shown, which central microprocessor receives electronic energy from the solar cell 40 or alternatively from the battery power supply 58. The combined central microprocessor and display driver 60 communicates with the display 42 through a display driver module not shown in Fig. 2 and communicates with a back-up store 62 constituted by an $E^2$ PROM (Electronic Erasable Programmable Read Only Memory). As is evident from the above description, the combined central microprocessor and display driver 60 further communicates with the input/output communication diodes 44 and 46 of the block 50 and optionally with an alternative input/output terminal 64 through the dotted line block 56. The terminal 64 may constitute a hard wire connection or a push button or keyboard switch of the electronic pricing module 34, by means of which keyboard switch the operation of the electronic pricing module may be shifted from a normal operational mode, in which the display 42 provides information regarding the price etc. of the articles or items to which the module in question is addressed, to an alternative operational mode, in which e.g. information relevant to the customers are displayed, e.g. general price information and discounts are displayed to the customer activating the

keyboard switch. Within the dotted line block 52, a block 66 is further shown, which block 66 constitutes a two-wire receiver, which two-wire receiver may be connected through a two-wire, i.e. a hard wire, connection, to the PC 18 through an appropriate serial communication gate for receiving information from the PC 18 shown in Fig. 1 instead of through the induction loop 32 if for some reason the electronic pricing module 34 cannot be addressed from the induction loop 32, e.g. in case the induction loop 32 has already been established and the electronic pricing module in question is arranged outside the area covered by the already existing induction loop 32. Within the above mentioned dotted line block 52, two alternative receiver sections are shown, which receiver sections are designated the reference numerals 68 and 70, respectively, and constitute an RF receiver, such as a VHF/UHF receiver, and the induction loop receiver, respectively. The output, i.e. the data transmission output from the dotted line block 54, is input to the data input of the combined central microprocessor and display driver 60 through a rectifier or detector block 72, which is housed within the dotted line block 52. The dotted line block 52 constitutes a block which is believed later on to be implemented in a custom designed LSI circuit (Large Scale Integrated), preferably an ASIC (Application Specified Integrated Circuit). The custom designed large-scale integrated circuit or ASIC may optionally include the induction loop receiver 70 and optionally the radio frequency receiver 68 and additionally the block 50 including the IR input/output communication diodes and further optionally any interface included within the dotted line block 56 for establishing connection to the above discussed push button or keyboard switch 64.

In Fig. 3, a detailed diagrammatical view of a prototype and test bench implementation of the electronic pricing module 34 according to the present invention is shown. The electronic pricing module 34 centrally comprises the above

described combined central microprocessor and liquid crystal display driver 60, which communicates with a first liquid crystal display 42' and optionally a second liquid crystal display 42'' together constituting the liquid crystal display 42 shown in Figs. 1 and 2. In the upper right-hand part of Fig. 3, the IR input/output communication block 48 is further shown. The microprocessor 60 is controlled by a crystal 72, which is arranged in a conventional oscillator configuration comprising two capacitors 74 and 76 and connected to two terminals of the combined microprocessor and liquid crystal display driver 60, which receives a positive supply voltage from a positive supply terminal 78, which voltage is smoothed by means of a smoothing and RF rejection capacitor 80 and is further grounded through a ground terminal 82.

In the prototype and test bench implementation shown in Fig. 3, the central microprocessor and liquid crystal display driver 60 communicates with the $E^2$ PROM 62, a CMOS switch assembly 84 serving the purpose of inputting data into and outputting data from the microprocessor and $E^2$ PROM 60 and 62, respectively. Thus, a first CMOS switch 86 of the CMOS switch assembly 84 inputs data from a node 90 to the microprocessor 60 and the $E^2$ PROM 62, and a second CMOS switch 88 outputs data from the microprocessor 60 and the $E^2$ PROM 62 to an output terminal 92. The terminal 92 constitutes a terminal of a multipin plug 94, which further comprises pins connected to the overall positive supply terminal and the overall ground terminal of the entire electronic circuitry.

A separate terminal 96 of the multipin plug 94 constitutes a terminal through which the microprocessor 60 may be addressed for carrying out a power-up/turn-down shift of the microprocessor, i.e. for switching the microprocessor from a power-up to a power-down operation mode and vice versa. The multipin plug 94 further includes a terminal 98,

through which a serial input data signal may be input through a frequency modulated (FM) phase locked loop (PLL) receiver circuit comprising an input gate 100 and three cascade connected inverters 102, 104 and 106. The output of the inverter 106 is connected to a terminal 108, which is connectable to the terminal 90 through a jump 110, which terminal 90 as discussed above is connected to the input switching CMOS switch 86 of the CMOS switch assembly 84. The FM/PLL or frequency modulated, phase locked loop receiver circuit further comprises the following components, a capacitor 301, resistors 302, 303 and 304, a capacitor 305, a resistor 306, a capacitor 307 and resistors 308 and 309. The combined microprocessor and liquid crystal display driver circuit 60 may, as will be readily understood, receive data from the terminal 90, which data are decoded in the FM/PLL or frequency modulated, phase locked loop receiver circuit comprising the IC's 100, 102, 104 and 106, or alternatively receive data from a two-wire connection which is connected to terminals of a multipin plug 112, which two-wire connection may further transfer electronic energy to the entire electronic circuitry shown in Fig. 3. Two terminals 114 and 116 of the multipin plug 112 are connected through a resistor or fuse 310 to two overvoltage protection zener diodes 118 and 120, which are connected back to back, and further to a full bridge rectifier circuit 122. The positive node of the full bridge rectifier circuit 122 is connected to a voltage regulator 128 through an inductor 126.

The terminals 114 and 116 are connected to an input of an inverter 130 through respective diodes, the output of which inverter 130 is connected to a terminal 132, which may be connected to the terminal 90 by shifting the jumper 110 from a short-circuiting connection between the terminal 108 and the terminal 190 to the short-circuiting connection between the terminal 132 and the terminal 190. The two-wire receiver section further comprises a capacitor 312,

diodes 313 and 314, a resistor 315, a capacitor 316, resistors 317 and 318, a resistor 319, a zener diode 320, and an operational amplifier 321.

Apart from the above described FM/PLL receiver circuit, the two-wire and power supply section, the $E^2$ PROM, the combined microprocessor and liquid crystal display driver and the liquid crystal displays shown in Fig. 3, the prototype and test bench implementation of the electronic pricing module 34 comprises a section shown in the left-hand part of Fig. 3, which section constitutes a watchdog including an operational amplifier 134, which section further comprises an input capacitor 325, diodes 326 and 327, a capacitor 328, a resistor 329, a diode 330, and resistors 331, 332, 333 and 334, and serves the purpose of controlling the operation of the combined central microprocessor and display drive 60 and of resetting the combined central microprocessor and display drive 60 if a malfunction occurs while the microprocessor is performing its internal routine. Thus, in case e.g. a noise signal causes the microprocessor to loop through its program without getting to the end of its internal routine, the watchdog which is initially set at the start of the routine performed by the microprocessor resets the microprocessor provided a predetermined period of time has lapsed from the initial setting of the watchdog consequently causing the microprocessor to return to its normal operational mode or normal routine at the start of its internal routine. It is believed that the watchdog constitutes a highly advantageous feature of the electronic circuitry shown in Fig. 3 as, contrary to many commercial and conventional microprocessor controlled apparatuses, which may occasionally go into a loop operation, the watchdog eliminates the risk of the microprocessor performing a loop operation without any possibility of returning to the normal operational mode or routine.

In Fig. 4, an electronic circuitry of an induction loop receiver implemented in accordance with an application note from National Semiconductor regarding the integrated circuit LM 3361A is shown. The circuitry centrally comprises an electronic integrated circuity block 150, which is preferably implemented by the above described integrated circuit, and which is connected to a long wave ferrite rod aerial 152. A dotted line block 154 includes an inductor 156 and a capacitor 158, which inductor and which capacitor are connected in a parallel configuration and constitute a tuned circuit tuning the induction loop receiver at its receiver frequency, such as a frequency of 100-150 kHz, e.g. 125 kHz.

In Fig. 5, a diagrammatical view of the electronic circuitry of the IR communication terminal 36 is shown. The electronic circuitry shown in Fig. 5 centrally comprises a microprocessor 160, which is supported by an expansion RAM (Random Access Memory) module 162, and which includes a liquid crystal display driver circuit, through which the microprocessor communicates with the liquid crystal display 52, also shown in Fig. 1. The microprocessor 160 also communicates with the keyboard 54, which is shown schematically in Fig. 5 and is arranged to a four-input AND gate 164, the output of which is connected to an address input of the microprocessor 160. The microprocessor 160 is controlled by a crystal oscillator 166, which is arranged in a conventional oscillator configuration comprising two capacitors 168 and 170. The microprocessor 160 receives a positive supply voltage from a jumper switch 172, which receives a positive supply voltage from a power supply, such as a battery of the communication terminal. The microprocessor 160 is reset by means of a capacitor 174 from the power supply constituted by the above mentioned battery as the overall electronic circuitry is turned on.

In the right-hand part of Fig. 5, the dotted line block 176 is shown, which dotted line block 176 constitutes an IR input/output block identical to the block 50 shown in Figs. 2 and 3. The block 176 comprises an IR emitter diode 178, the anode of which is connected to the positive supply rail or terminal of the entire electronic circuitry, and the cathode of which is connected to a collector of an NPN transistor 180, the base of which is connected to a control terminal of the microprocessor, and the emitter of which is grounded through an emitter resistor 182. The block 176 further comprises an IR receiver diode 184, which is connected across an inverting and a non-inverting input of an operational amplifier 186, the inverting input of which is further connected to the output of the operational amplifier through a series configuration of a resistor 188 and a capacitor 190. The output of the operational amplifier 186 is connected to an input terminal of the microprocessor 160.

In Fig. 6, an electronic circuitry implemented in accordance with an application note from the company Plessey regarding the integrated circuitry of the type SL 6638 or SL 6639 supplied from Plessey is shown, which electronic circuitry constitutes a 50 mHz VHF receiver constructed for VHF or paging service or operation. The electronic circuitry comprises an integrated circuitry block 200, preferably constituted by the above-mentioned integrated circuit from Plessey and an aerial 202. The electronic circuitry further comprises the components mentioned in example 4 below.

In Fig. 7, a first embodiment of the electronic pricing module 34 is shown. Basically, the electronic pricing module 34 comprises, as is evident from Fig. 7, two housing parts 210 and 212 constituting a rear housing part and a front housing part, respectively. The front housing part 212 is provided with four apertures, a major aperture 214

in which the liquid crystal display 42 is exposed, two minor apertures 216 and 218, in which the IR receiver and emitter diodes 44 and 46 are arranged, and a fourth aperture 220, in which the solar cell 40 is arranged. The IR emitter and receiver diodes 44 and 46, respectively, are mounted on a supporting substrate or supporting circuit board 222. As is evident from Fig. 7, the solar cell 40 may be substituted by a battery power element 58, which is shown in dotted line. The through-plated hybrid substrate or circuit board 224 is at its upper and lower edges provided with conductive terminals, one of which is designated the reference numeral 230, which terminals serve the purpose of establishing electrically conductive connection from the terminal in question to a respective terminal of the liquid crystal display 42, such as a terminal designated the reference numeral 232 through a conductive strip 234, which is a commercially available elastomeric material, in which through-going noble metal wires are embedded. In Fig. 7, the through-plated hybrid substrate or circuit board 224 is shown from a first side, which faces the rear side of the liquid crystal display 42.

In Fig. 8, an alternative or second embodiment of the electronic pricing module 34 is shown. Basically, the embodiment shown in Fig. 8 differs from the first embodiment discussed above with reference to Fig. 7 in that the hybrid substrate or circuit board 224 has been turned around so that the side surface of the hybrid substrate or circuit board 224 facing the liquid crystal display 42 is a bare side surface to which through-platings are provided, such as a through-plating designated the reference numeral 252. The through-plating 252 is provided in registration with a respective terminal, such as the terminal 232, of the liquid crystal display 42. While in Fig. 7, the electrically conductive connection between the terminals of the hybrid substrate or circuit 224 and the liquid crystal display 42 is established by means of the conductive strip

234, which also serves the purpose of mechanically supporting the hybrid substrate or circuit board 224 relative to the liquid crystal display 42, the hybrid substrate or circuit board 224 is in the alternative or second embodiment shown in Fig. 8 glued directly onto the rear side of the liquid crystal display 42, and electrical connection between the through-platings of the hybrid substrate or circuit board 224 and the terminals 232 of the liquid crystal display 42 is established by means of a conductive paste which is sprayed through the through-platings. In Fig. 8, an additional feature of the electronic pricing module technique according to the present invention is shown. On the hybrid substrate a circuit board 224 shown in Fig. 8 additional hybrid modules or substrates 226 and 228 are mounted, as shown in Fig. 8. Thus, the substrate 228 may constitute a receiver module, which for different applications may be substituted by different receiver sections, e.g. for adapting the electronic pricing module 34 to a specific application, e.g. for shifting from induction loop reception to e.g. VHF or UHF reception.

In Figs. 7 and 8, electronic circuit components are also shown mounted on the through-plated hybrid substrate or circuit board 224, e.g. electronic circuit packages 248 and 250 shown in Fig. 7 and LSI (Large Scale Integrated) electronic circuit packages 236 and 238 shown in Fig. 8 and also SMD (Surface Mounted Device) components, such as SMD components designated the reference numerals 240 and 242 shown in Fig. 7 and SMD components designated the reference numerals 244 and 246 shown in Fig. 8.

In Fig. 9, a diagrammatical view of a single addressing message transmitted from the induction loop amplifier or transmitter 30 shown in Fig. 1 through the induction loop 32 to the electronic pricing modules 34 is shown. The message comprises the following segments: A, B, C, D, E, F and G. The segment A constitutes a power-up order by which

the microprocessors of the electronic pricing modules 34 are powered up from a power-down or idle operational mode, in which the power consumption is low.

The segment B constitutes an address which defines the intentional receiver of the message in question. The address B is preferably an address preset by the manufacturer of the module in question, i.e. an address which positively identifies the intentional receiver. After the receipt of the segment B, all pricing modules except for the intentional receiver, i.e. the receiver identified by the address segment B, turn down for shifting to a low power operational mode.

After the receipt of the B segment, the intentional message receiving electronic pricing module receives the C segment, which defines the goods or items to be "labeled" by the electronic pricing module in question. The C segment identifies the goods or items in question by a number and further preferably by a bar code, preferably an EAN code.

The D segment defines a destination command, i.e. a command identifying whether or not the data of the C segment are to be presented to customers in plain text or to be dealt with as hidden information to which access is only available if the electronic pricing module in question is addressed from the IR transmission terminal 36 shown in Fig. 1.

The E segment constitutes in the first instance a segment defining the price of the goods or items in question and further any additional information to be displayed to the customers, such as the price per unit, per kilo, per litre, etc. In the second instance, the data identifies previous prices, turnovers, last week's sales rate, the number of goods or items to be present on the stand in question, etc. As will be readily understood, the provision of the hidden information to be transferred from the back office

computer 14 to the individual electronic pricing module 34 provides a highly advantageous feature of the present invention, as the staff of the shop may at each individual electronic pricing module 34 obtain relevant information regarding the goods or items in question from the electronic pricing module addressed to the goods or items.

The F segment constitutes a check segment, in which a sum of the bits of the previous command segments is included, which check segment serves the purpose of rendering it possible to determine whether or not the transmission has been carried out correctly or not.

The G segment defines an end of a message signal. In the presently preferred embodiment of the present invention, the A, D, F and G segments are 1 Byte segments, the B segment is a 3 Bytes' segment, the C segment is a 6 Bytes' segment, and the E segment is a 30 Bytes' segment. It is to be realised that the 3 Bytes' B segment includes approximately 16.7 million combinations or individual addresses.

EXAMPLE 1

The prototype and test bench implementation of the electronic circuitry of the electronic pricing module 34 shown in Figs. 2 and 3 was made from the following components:

Central microprocessor and liquid crystal display driver 60 was an Intel 8751 microprocessor,
the liquid crystal displays 42' and 42'' (a single liquid crystal display unit was used for the test) were of the type Epscn D24016ER-S,
the crystal 72 was a 12 MHz crystal,
the CMOS switch assembly 84 was of the type 74Hz367,
the $E^2$ PROM 62 was of the type X2444 supplied from the company Xicor,
the integrated circuit 100 was of the type 4046,

the capacitor 301 was a 470 pF capacitor,
the resistor 302 was a 100 kΩ resistor,
the resistor 303 was a 1 MΩ resistor,
the resistor 304 was a 100 kΩ resistor,
the capacitor 305 was a 100 nF capacitor,
the inverters 102, 104, 106 and 130 were implemented by Schmitt triggers of the type 4584,
the resistor 306 was a 33 kΩ resistor,
the capacitor 307 was a 1 μF capacitor,
the resistor 308 was a 330 kΩ resistor,
the resistor 309 was a 1 kΩ resistor,
the component 310 was a 100 mA fuse,
the zener diodes 118 and 120 were 18 V zener diodes,
the capacitor 312 was a 100 nF capacitor,
the full bridge rectifier 122 was a integrated full bridge rectifier circuit of the type W005M supplied from General Instruments,
the diodes 313 and 314 were diodes of the type IN4148,
the resistor 315 was a 100 kΩ resistor,
the inductor 126 was a 100 μH choke or inductor,
the capacitor 316 was a 100 μF capacitor,
the resistors 317 and 318 were 20 kΩ and 6.0 Ω resistors, respectively,
the voltage regulator 128 was a 7805 +5V voltage regulator,
the resistor 319 was a 2.0 kΩ resistor,
the zener diode 320 was a 3.3 V zener diode,
the operational amplifier 321 was an LM358 amplifier.

The watchdog was made from the following components:

The operational amplifier 134 was a LM358 operational amplifier manufactured by National Semiconductors,
the capacitor 325 was a 100 nF capacitor,
the diodes 326 and 327 were 1N 4140 diodes,
the capacitor 328 was a 1μF capacitor,
the resistor 329 was a 1N resistor,
the diode 330 was a 1N 4148 diode,

the resistor 331 was a 100 kΩ resistor,
the resistor 332 was a 1 MΩ resistor,
the resistors 333 and 334 were 100 kΩ resistors.

EXAMPLE 2

The induction loop receiver shown in Fig. 4 was made from the following components:

the IC 150 was LM 3361A
the capacitor 501 was a 330 pF capacitor,
the capacitor 502 was a 100 nF capacitor,
the capacitors 503 and 504 were 100 nF capacitors,
the capacitor 504 was a 2 n 2F capacitor,
the capacitor 158 and the inductor 156 were tuned to 125 kHz,
the capacitor 505 was a 1 nF capacitor,
the resistor 506 was a 6.8 kΩ resistor,
the capacitor 507 was a 10 n capacitor.

EXAMPLE 3

The hand-held IR communication terminal 36 shown in Fig. 5 is made from the following components:

the central microprocessor 160 is an Intel 8751 microprocessor,
the expansion RAM module 162 is a 74HC573, a 6264 RAM and a battery backup,
the crystal 166 is a 12 MHz,
the capacitors 168 and 170 are 22 pF capacitors,
th apacitor 174 is a 10 μF capacitor,
the resistor 550 is 8.2 kΩ,
the display 52 is an Epson D2401GER-S,
the potentiometer 552 is a 10 kΩ potentiometer,
the four input AND gate 164 is a 74HC21 integrated circuit,

the keyboard 54 is composed of MEC MKII keyboard switches,
the operational amplifier 186 is an LM 358,
the resistor 188 is a 4.7 kΩ resistor,
the capacitor 190 is a 47 pF capacitor,
the resistor 182 is a 39 Ω resistor,
the NPN transistor 180 is a BC547 transistor,
the IR emitter diode 178 is a LC271 diode,
and the IR receiver diode 184 is a BP104 diode.

EXAMPLE 4

The VHF receiver shown in Fig. 6 is implemented in accordance with Plessey application note regarding the Plessey paging receiver circuit SL6638,
the integrated circuit 200 is a Plessey SL6638 or SL6639 integrated circuit,
the aerial 202 was a ferrite antenna,
the resistor 401 is a 220 kΩ resistor,
the resistor 402 is a 15 kΩ resistor,
the resistor 403 is a 100 Ω resistor,
the resistor 404 is a 39 kΩ resistor,
the resistor 405 is a 22 kΩ resistor,
the resistor 406 is a 2.7 kΩ resistor,
the resistor 407 is a 22 kΩ resistor,
the resistor 408 is a 15 kΩ/180 kΩ resistor,
the resistor 409 is a 6.6 kΩ/100 kΩ resistor,
the resistor 410 is a 100 kΩ resistor,
the resistor 411 is a 100 kΩ resistor,
the resistor 412 is a 100 kΩ resistor,
the resistor 413 is a 100 kΩ resistor,
the resistor 414 is a 6.6 kΩ resistor,
the resistor 415 is a 22 kΩ resistor,
the resistor 416 is a 15 kΩ/180 kΩ resistor,
the resistor 417 is a 2.7 kΩ resistor,
the resistor 418 is a 22 kΩ resistor,
the resistor 419 is a 39 kΩ resistor,
the resistor 420 is a 15 kΩ resistor,
the capacitor 561 is a 8.2 pF capacitor,
the capacitor 562 is a 2.10 pF capacitor,
the capacitor 563 is a 22 pF capacitor,
the capacitor 564 is a 10 μF capacitor,
the capacitor 565 is a 1 nF capacitor,
the capacitor 566 is a 10 μF capacitor,
the capacitor 567 is a 10 μF capacitor,
the capacitor 514 is a 27 pF capacitor,

the capacitor 515 is an 8.2 pF capacitor,
the capacitor 516 is a 1 nF capacitor,
the capacitor 517 is a 1 nF capacitor,
the capacitor 521 is a 8.2 pF capacitor,
the capacitor 522 is a 1 nF capacitor,
the capacitor 523 is an 8.2 nF capacitor,
the capacitor 524 is a 1 nF capacitor,
the capacitor 526 is 1 nF capacitor,
the capacitor 527 is a 15 pF capacitor,
the capacitor 528 is 1 nF capacitor,
the capacitor 529 is a 22 pF capacitor,
the capacitor 530 is a 1 nF capacitor,
the capacitor 531 is a 1 $\mu$F capacitor,
the capacitor 532 is a 1 $\mu$F capacitor,
the component 623 is a 220 nH choke,
the component 624 is a 10 $\mu$H choke,
the component 626 is a 153 mHz 7th/9th overtone crystal, and
the component 627 is choke constituted by 3 turns of 0.45 diameter enamelled wire on 3.5 mm diameter form (available from Wainwright Instruments, type VCF-1),
the component 625 is a 220 choke similar to the component or choke 627 but with an axial winding of 4 turns.

CLAIMS

1. An electronic pricing system comprising:

a central computer means generating information regarding a specific article, said information including an address code identifying said article, and a price code identifying the price of said article,

a wireless transmitter means receiving said information from said central computer means and generating a transmission signal,

an aerial means connected to said wireless transmitter means for receiving said transmission signal therefrom and for wireless transmitting said transmission signal,

a plurality of electronic pricing modules each having a specific address code and each including

a wireless receiver means for receiving said transmission signal from said aerial means and for converting said transmission signal into a receiver signal including an address code and a price code,

a comparator means for determining whether said receiver signal generated by said wireless receiver means includes an address code identical to said specific address code of said individual electronic pricing module or not,

a memory means for storing said price code of said receiver signal generated by said wireless receiver means provided said comparator means has positively determined identity between said address code of said receiver signal and said specific address code of said individual electronic pricing module,

a display means for displaying said price code stored in said memory means,

an IR input/output means for input of information into and output of information from said memory means through said IR input/output means, and

an IR communication terminal comprising an electronic memory means, an actuator means and an IR input/output means for, in a first operational ode, by activation of said actuator means, output of information from said electronic memory means of said IR communication terminal to said IR input/output means of a specific electronic pricing module for storing said information in said memory means of said specific electronic pricing module, and for, in a second operational mode by activation of said actuator means, input of information from said specific electronic pricing module, which information is output from said memory means of said specific electronic pricing module and output from said IR input/output means thereof to said IR input/output means of said IR communication terminal for storing said information in said memory means thereof.

2. An electronic pricing system according to claim 1, said wireless transmitter means being an induction loop transmitter generating an amplitude modulated, frequency modulated or phase modulated long wave transmission signal, such as a transmission signal of a frequency of 10-150 kHz, and said aerial means being an induction loop tuned to said frequency.

3. An electronic pricing system according to claim 1, said wireless transmitter means being a VHF or UHF transmitter generating an amplitude modulated, frequency modulated or phase modulated VHF or UHF transmission signal, such as a transmission signal of a frequency of 20 MHz - 1 GHz, and said aerial means being a VHF or UHF aerial.

4. An electronic pricing system according to any of the claims 1-3, said electronic pricing module including a central processor means comprising said memory means and said comparator means.

5. An electronic pricing system according to any of the claims 1-4, said electronic pricing module further including a hard-wire input means for receiving an input signal constituting said receiver signal including said address code and said price code.

6. An electronic pricing system according to any of the claims 1-5, said central computer means generating information additional including an additional code, said electronic pricing module additionally converting said transmission signal into a receiver signal additionally including an additional code, said memory means additionally storing said additional code provided said comparator means has positively determined identity between said address code of said receiver signal and said specific address code of said individual electronic pricing module, and said IR communication terminal additionally, in a third operational mode by activation of said actuator means, addressing said memory means of said specific electronic pricing module through said IR input/output means of said IR communication terminal and through said IR input/output means of said specific electronic pricing module for displaying said additional code stored in said memory means of said specific electronic pricing module on said display means of said specific electronic pricing module.

7. An electronic pricing system according to any of the claims 1-6, said specific electronic pricing module comprising an integral power supply means.

8. An electronic pricing system according to claim 7, said integral power supply means including a solar cell.

9. An electronic pricing system according to claim 7, said integral power supply means including a battery power supply means.

10. An electronic pricing system according to claims 5 and 8, said battery power supply means comprising a rechargeable power supply means, and said hard wire input means further receiving a power supply signal for recharging said rechargeable power supply means.

11. An electronic pricing system according to any of the claims 1-10, said address code and said price code and optionally said additional code being transmitted in serial configuration.

12. An electronic pricing system according to claim 6, said central computer means alternatively generating an addressing signal, said wireless transmitter means alternatively receiving said addressing signal and generating an addressing transmission signal, which is transmitted by means of said aerial means and received by said individual wireless receiver means of said plurality of electronic pricing modules, said individual wireless receiver means receiving said addressing transmission signal and converting said addressing transmission signal into an addressing signal for addressing said memory means of said individual electronic pricing module for displaying said additional code stored in said memory means of said individual electronic pricing module on said display means thereof.

13. An electronic pricing module comprising:

a wireless receiver means for receiving a transmission signal from an aerial means, and for converting said transmission signal into a receiver signal including an address code and a price code,

a comparator means for determining whether said receiver signal generated by said wireless receiver means includes an address code identical to a specific address code of said individual electronic pricing module,

a memory means for storing said price code of said receiver signal generated by said wireless receiver means

provided said comparator means has positively determined identity between said address code of said receiver signal and said specific address code of said individual electronic pricing module,

a display means for displaying said price code stored in said memory means, and

an IR input/output means for input of information into and output of information from said memory means through said IR input/output means, and

further having any of the characteristics of the electronic pricing modules of the electronic pricing system according to any of the claims 1-11.

14. An IR communication terminal comprising an electronic memory means, an actuator means and an IR input/output means for, in a first operational mode by activation of said actuator means, output of information from said electronic memory means of said IR communication terminal to an IR input/output means of an electronic pricing module of the electronic pricing system according to any of the claims 1-11, and for in a second operational mode by actuation of said actuator means, input of information from said specific electronic pricing module, through said IR input/output means thereof to said IR input/output means of said IR communication terminal for storing said information in said memory means thereof, and further comprising any of the features of the IR communication terminal of the electronic pricing system according to the any of the claims 1-11.

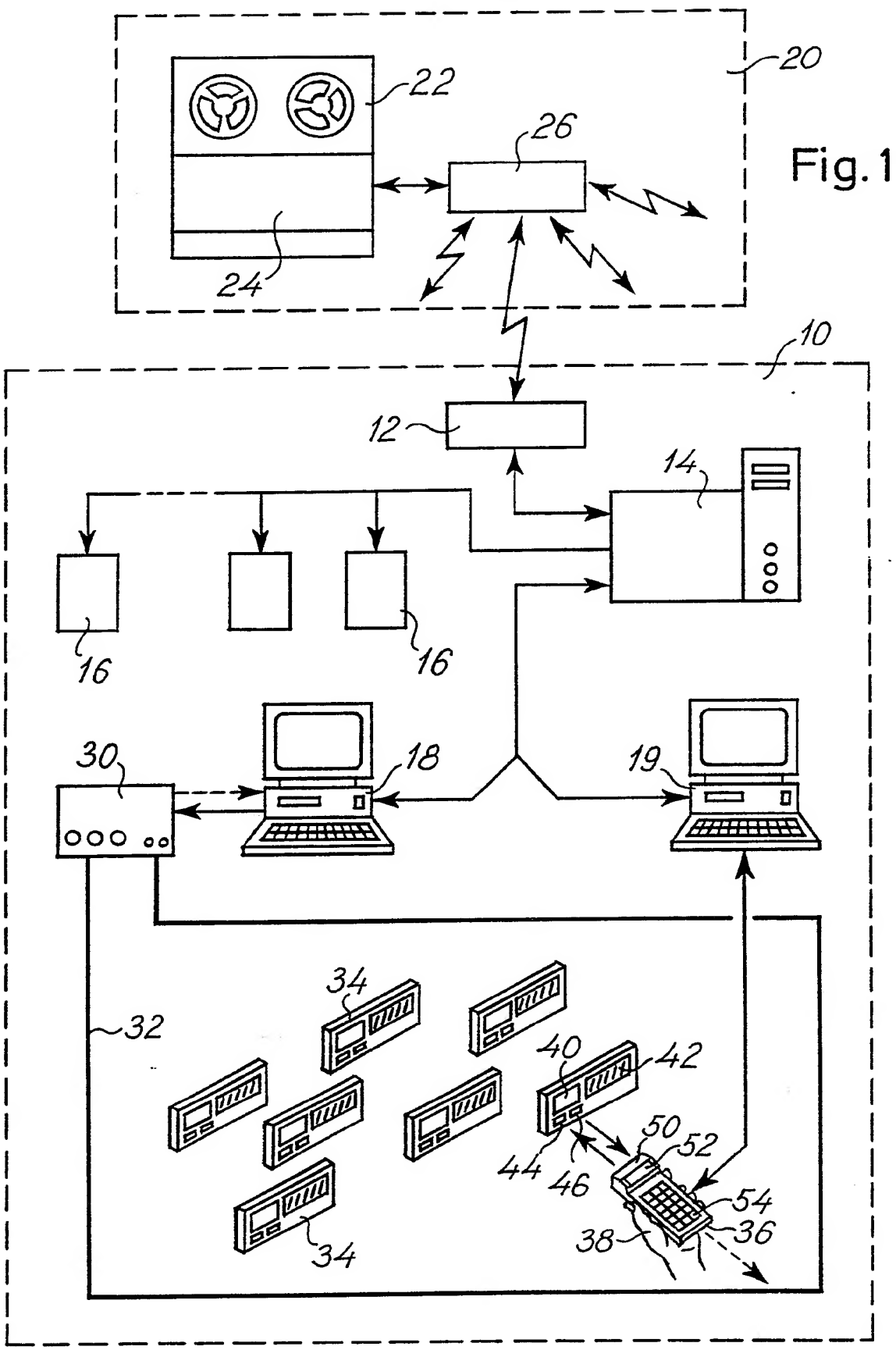
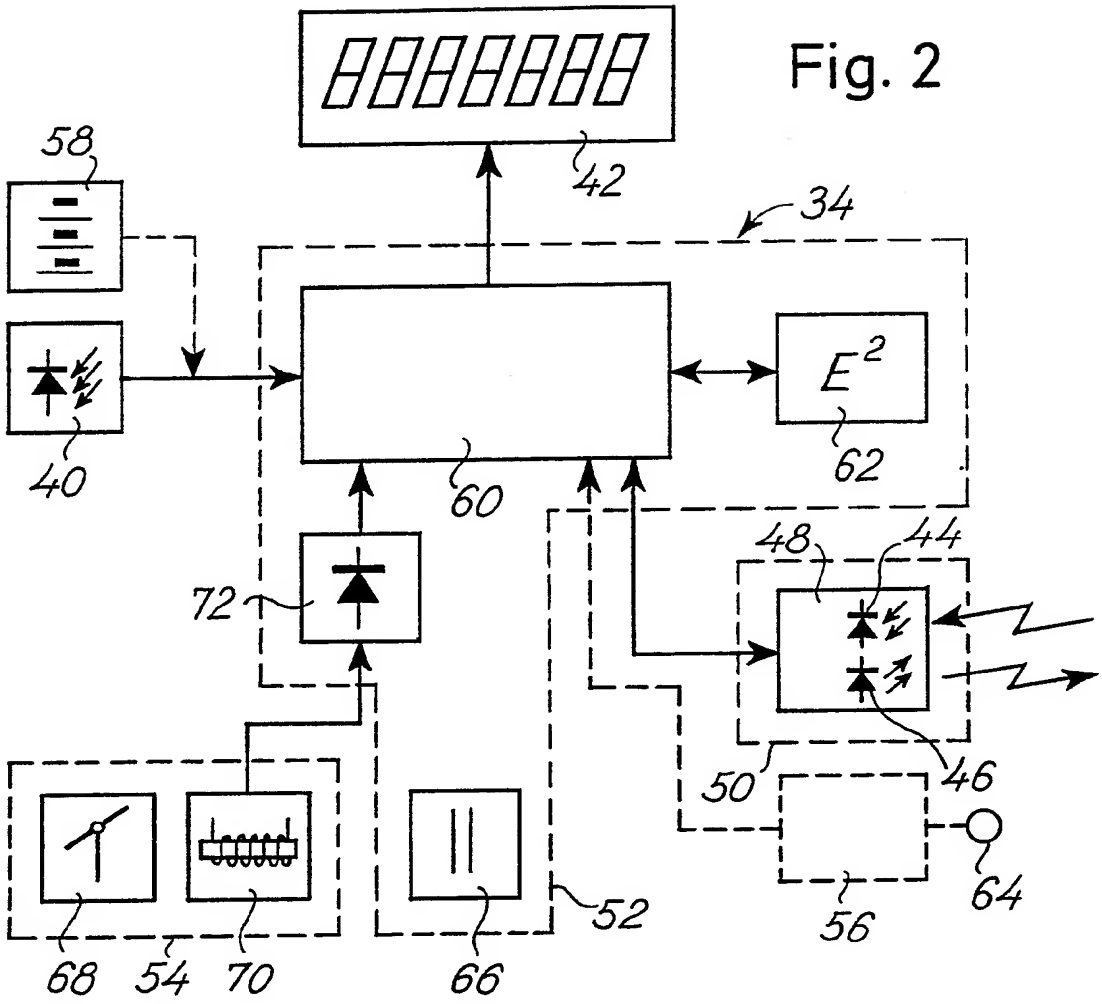



Fig. 1


58
42
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$E^2$
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44
46
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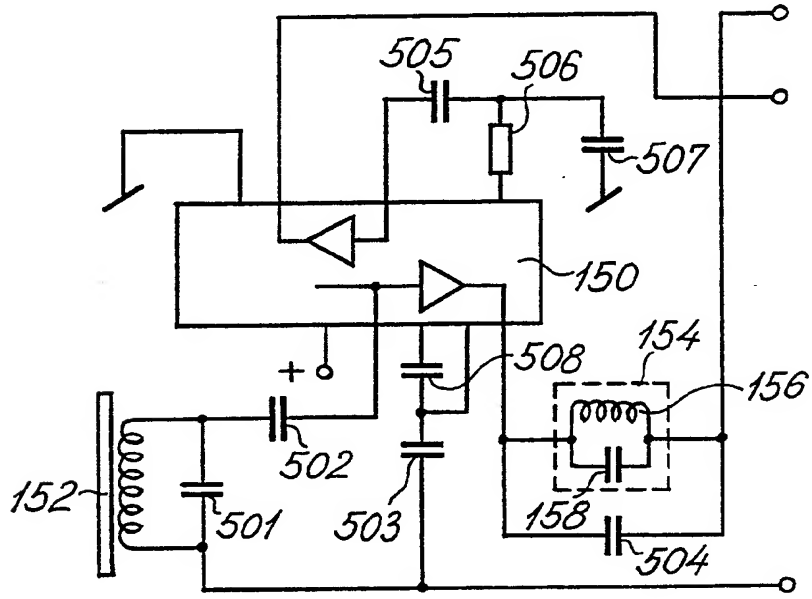
66
52

Fig. 2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506
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150
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156
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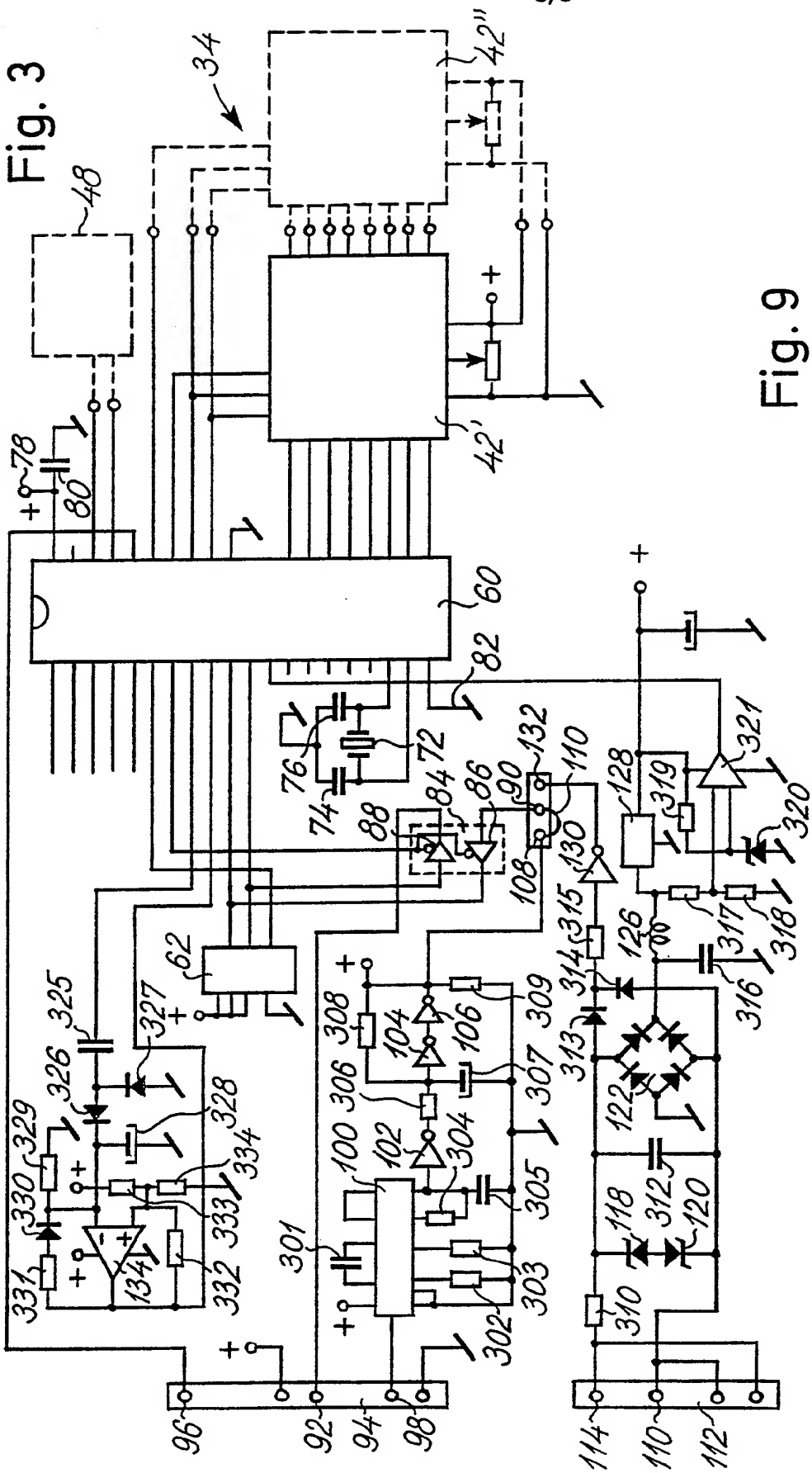
501
503
158
504

Fig. 4

Fig. 3


34
42''
42'
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78
80
60
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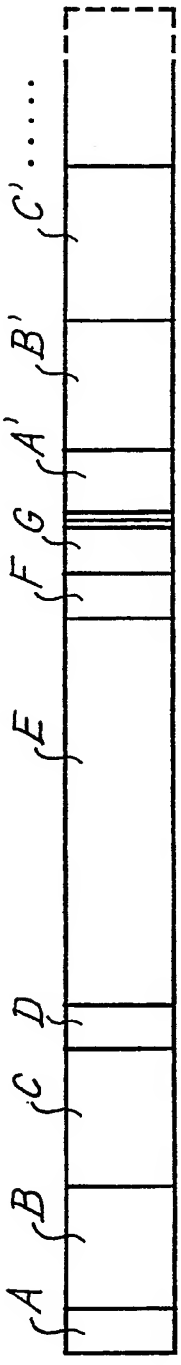
Fig. 9


A
B
C
D
E
F
G
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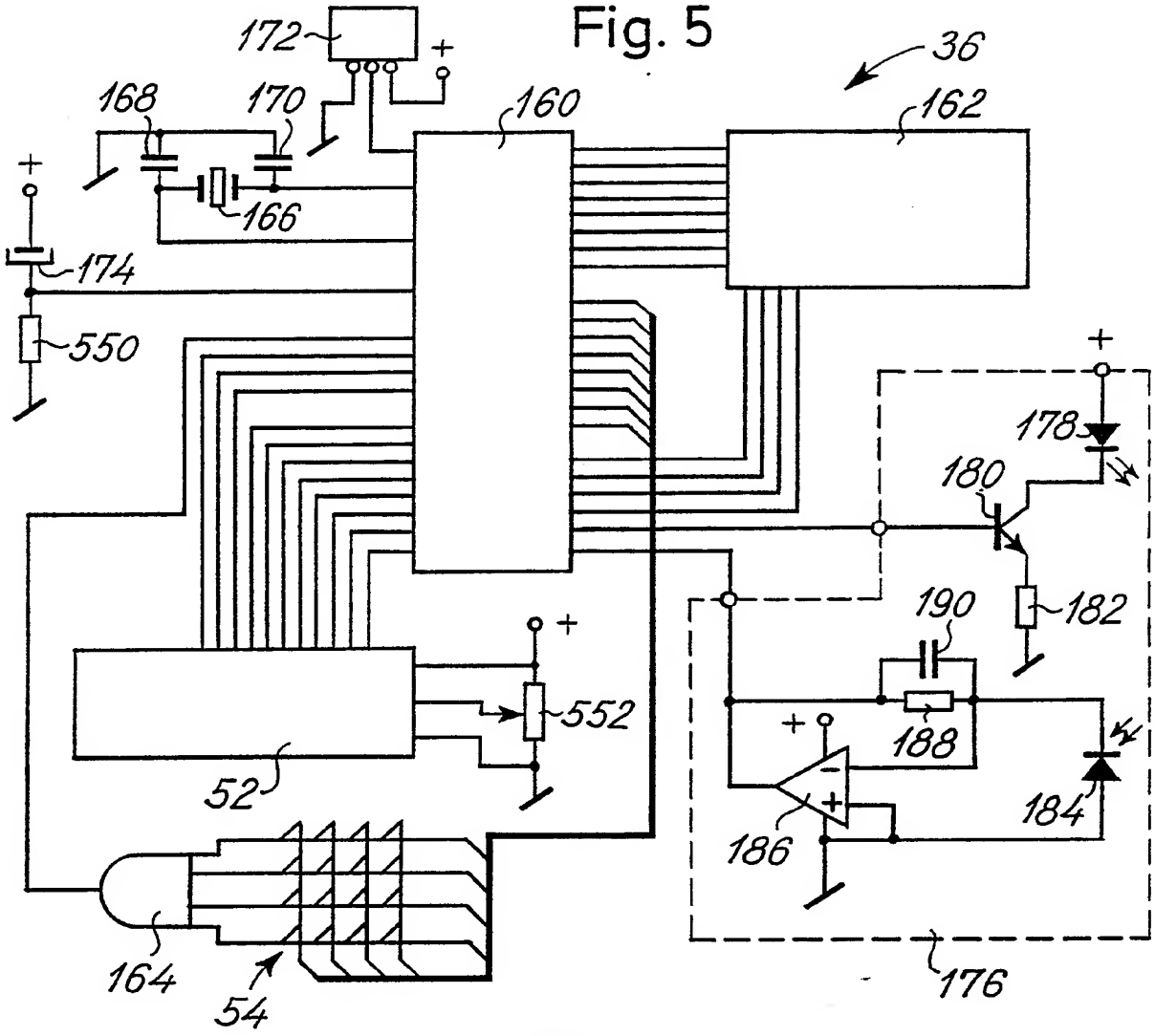
B'
C' .....

Fig. 5


172
+
168
170
160
162
36
166
174
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180
190
182
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188
52
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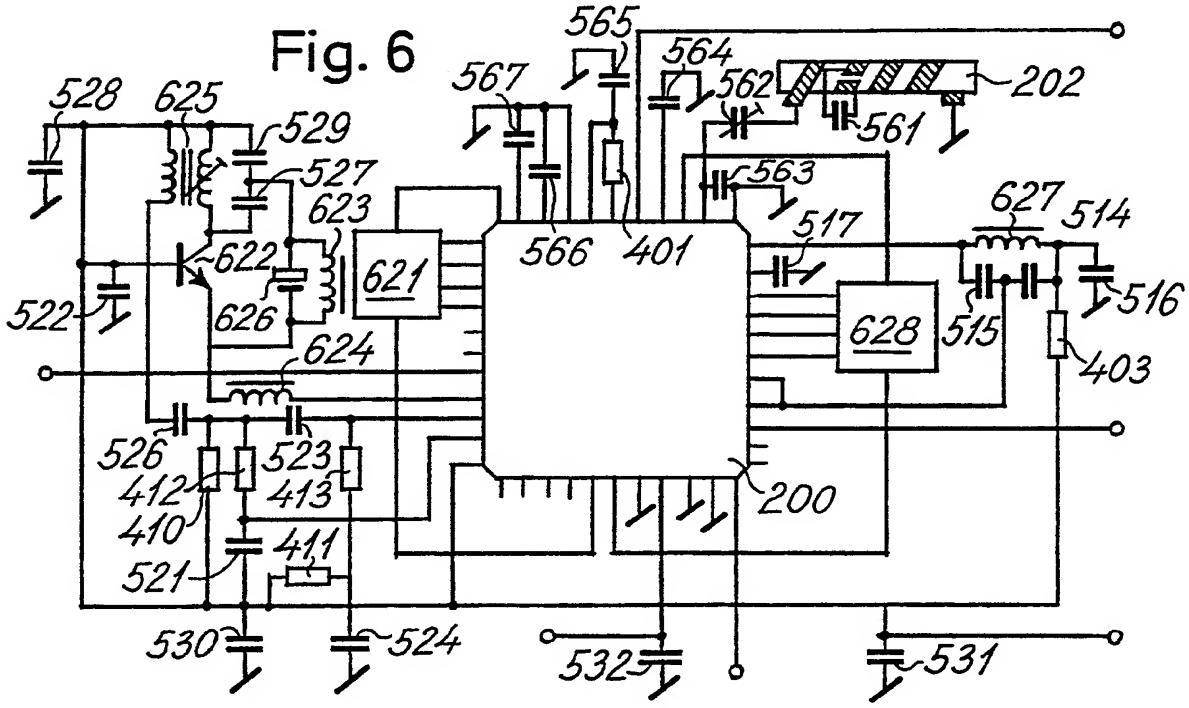
164
54
176

Fig. 6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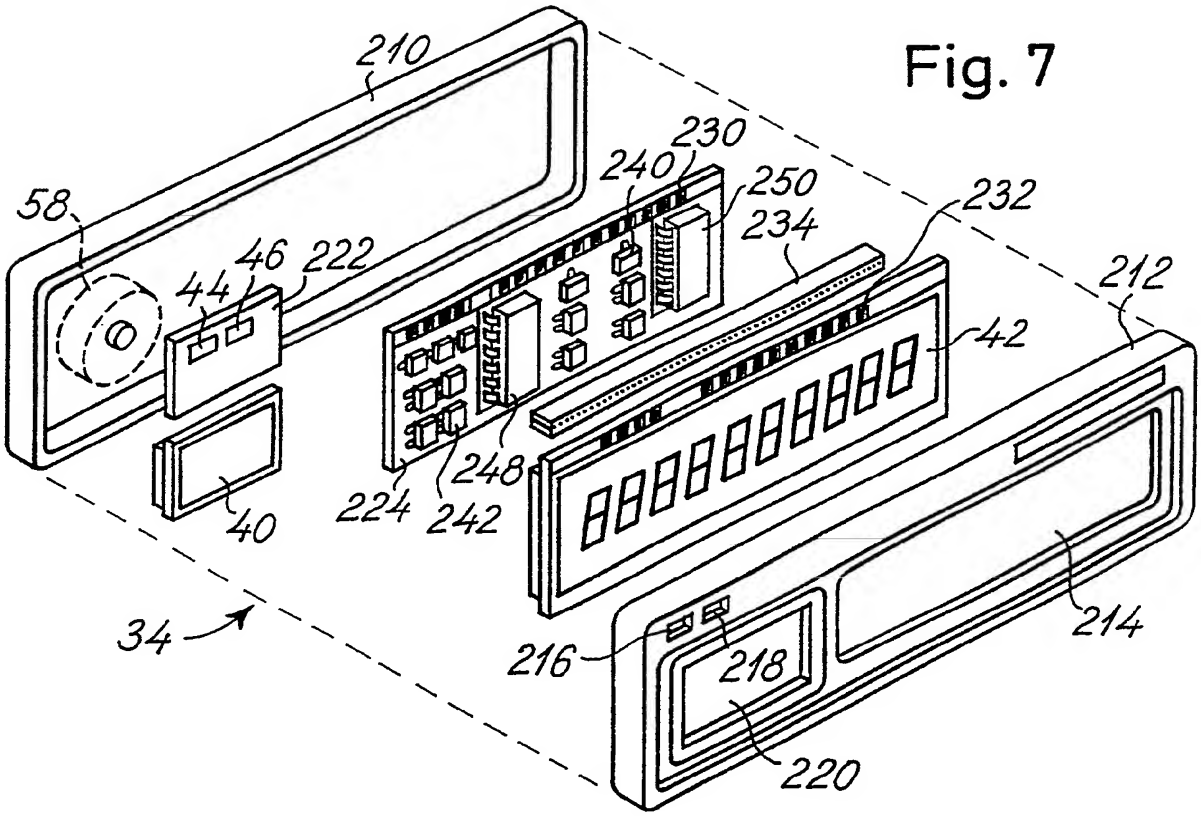
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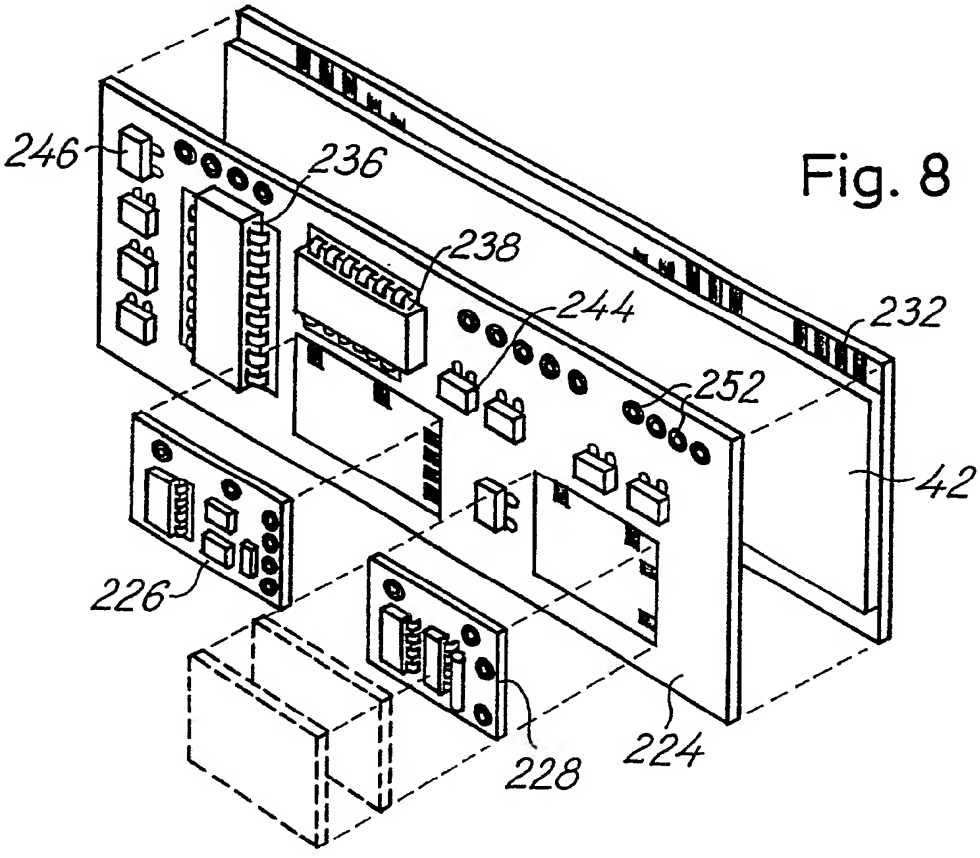
Fig. 7


246
236
238
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232
252
42
226
228
224

Fig. 8

# INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 91/00280

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: G 06 F 15/21, G 06 F 3/147, H 04 H 1/00, G 07 G 1/14

## II. FIELDS SEARCHED

Minimum Documentation Searched[7]

| Classification System | Classification Symbols |
|---|---|
| IPC5 | G 06 F; H 04 H; G 07 G; A 47 F |

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched[8]

SE,DK,FI,NO classes as above

## III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

| Category * | Citation of Document,[11] with indication, where appropriate, of the relevant passages[12] | Relevant to Claim No.[13] |
|---|---|---|
| A | US, A, 4821291 (J.K. STEVENS ETAL) 11 April 1989, see the whole document -- | 1-4,7,9, 11-13 |
| A | WO, A1, 8602477 (UNIGRAFIC AG) 24 April 1986, see the whole document -- | 1,7,9, 14 |
| A | WO, A1, 9000775 (HELLQUIST, M. ET AL) 25 January 1990, see the whole document -- | 1,2,7,8, 11,13 |

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* Special categories of cited documents:[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

## IV. CERTIFICATION

| Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report |
|---|---|
| 27th November 1991 | 1991 -12- 17 |
| **International Searching Authority** | **Signature of Authorized Officer** |
| SWEDISH PATENT OFFICE | JAN SILFVERLING |

Form PCT/ISA/210 (second sheet) (January 1985)

# ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.PCT/DK 91/00280

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 31/10/91
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent document cited in search report | Publication date | Patent family member(s) | | Publication date |
|---|---|---|---|---|
| US-A- 4821291 | 89-04-11 | AU-D- | 7846387 | 88-03-24 |
| | | DE-A- | 3731852 | 88-05-19 |
| | | FR-A- | 2604315 | 88-03-25 |
| | | GB-A-B- | 2197564 | 88-05-18 |
| | | GB-A- | 2228812 | 90-09-05 |
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